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REMARKS

Claims 1-3, 6-13, 16-22, 25-28, 30-34, 38-46, and 49-62 are pending in the application. Claims 1, 6-7, 9, 11, 13, 16-17, 21, 30-31, 33, 42, 49 and 60-62 have been amended to more particularly define the invention.

It is noted that the claim amendments are made only for more particularly pointing out the invention, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicants specifically state that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Claim 49 stands rejected under 35 U.S.C. §112, second paragraph.

Claims 1-3, 6-10, 21, 22, 26-28, 30-34, 38, 40-42, 59, 61 and 62 stand rejected under 35 U.S.C. §103(a) as obvious over U.S. Patent No. 6,252,254 to Soules et al. (hereinafter, Soules), in view of U.S. Patent No. 5,847,507 to Butterworth et al. (hereinafter, Butterworth), U.S. Patent No. 5,798,536 to Tsutsui, and U.S. Patent No. 5,877,558 to Nakamura et al. (hereinafter, Nakamura). Claims 11-13, 16-20, 39 and 60 stand rejected under 35 U.S.C. §103(a) as unpatentable over Soules, Butterworth, Tsutsui, and Nakamura as applied to the claims above, and further in view of U.S. Patent No. 6,153,123 to Hampden-Smith et al. (hereinafter, Hampden-Smith). Claim 25 stands rejected under 35 U.S.C. §103(a) as unpatentable over Soules, Butterworth, Tsutsui, and Nakamura as applied to the claims above, and further in view of U.S. Patent No. 6,166,489 to Thompson et al. (hereinafter, Thompson). Claims 46, 49, and 50 stand rejected under 35 U.S.C. §103(a) as unpatentable over Soules, Butterworth, Tsutsui, and Nakamura as applied to the claims above, and further in view of U.S. Patent No. 6,340,824 to Komoto et al. (hereinafter, Komoto). Claims 43-45 stand rejected under 35 U.S.C. §103(a) as unpatentable over Soules, Butterworth, Tsutsui, and Nakamura as applied to the claims above, and further in view of U.S. Patent No. 5,998,925 to Shimizu et al. (hereinafter Shimizu). Claims 51-58 stand rejected under 35 U.S.C. §103(a) as unpatentable over Soules, Butterworth, Tsutsui, and Nakamura as applied to the claims above, and further in view of U.S. Patent No. 6,335,217 to Chiyo et al. (hereinafter Chiyo).

These rejections are respectfully traversed in view of the following discussion.

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I. THE CLAIMED INVENTION

The claimed invention (e.g., as defined by exemplary claim 1) is directed to a light-emitting apparatus that includes a primary light source including a GaN semiconductor light-emitting device that emits a first light of a wavelength of 380 nm to 500 nm, the GaN semiconductor light-emitting device including a single reflective layer, and a transparent electrode disposed above the single reflective layer, and a lead frame including a cup portion including a bottom surface on which the GaN semiconductor light-emitting device is mounted, a secondary light source including a fluorescent material that includes at least one of ZnS:Cu, Au, Al; ZnS:Cu, Al; ZnS:Cu; and Y₂O₂S:Ce, and a fluorescent material resin, the fluorescent material being dispersed within the fluorescent material resin, and the fluorescent material resin being contained in the cup portion, and a sealing member that focuses light emitted from the light-emitting apparatus, the sealing member being disposed above the secondary light source, in which the fluorescent material absorbs the first light of a first wavelength and emits a second light of a second wavelength, which is greater than the first wavelength.

Conventional light-emitting apparatus can emit white light by using a blue-light-emitting diode and a fluorescent material of photoluminescence in combination. An yttrium-aluminum-garnet fluorescent material may be activated by cerium (Ce) to absorb light emitted from the blue light-emitting diode and emit yellow light. The blue light emitted from the light-emitting diode and the yellow light emitted from the fluorescent material are mixed together to generate white light.

The claimed invention of exemplary claim 1, on the other hand, provides a light-emitting apparatus that includes a primary light source including a GaN semiconductor light-emitting device that emits a first light of a wavelength of 380 nm to 500 nm, the GaN semiconductor light-emitting device including a single reflective layer, and a transparent electrode disposed above the single reflective layer (e.g., see Application at page 22, line 25 through page 23, line 6), and a leadframe including a cup portion including a bottom surface on which the GaN semiconductor light-emitting device is mounted, a secondary light source comprising a fluorescent material that includes at least one of ZnS:Cu, Au, Al; ZnS:Cu, Al;

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ZnS:Cu; and $Y_2O_3S:Ce$, and a fluorescent material resin, the fluorescent material being dispersed within the fluorescent material resin, and the fluorescent material resin being contained in the cup portion, and a sealing member that focuses light emitted from the light-emitting apparatus, the sealing member being disposed above the secondary light source, in which the fluorescent material absorbs the first light of a first wavelength and emits a second light of a second wavelength, which is greater than the first wavelength (e.g., see Application at page 2, lines 13-25). The transparent electrode enhances the efficiency of light extracted from the GaN semiconductor light emitting device.

II. INDEFINITENESS REJECTION

Claim 49 stands rejected under 35 U.S.C. §112, second paragraph. Claim 49 has been amended to overcome this rejection.

Specifically, claim 49 has been amended to recite “wherein said fluorescent material is dispersed in a fluorescent material layer disposed above said sealing member and absorbs said first light of a first wavelength and emits a second light of a second wavelength, which is greater than said first wavelength”. The fluorescent material (36) is dispersed in a fluorescent material layer (710) which is disposed above the sealing resin (50) as shown in Figure 12 of the Application.

Therefore, Applicants respectfully submit that claim 49 is not indefinite.

III. THE PRIOR ART REFERENCES

A. The Soules Reference

Applicants submit that there are elements of the claimed invention that are not taught or suggested by Soules.

That is, Soules does not teach or suggest “*a transparent electrode disposed above said single reflective layer*” as recited in independent claim 1, and similarly recited in independent claims 11, 21, and 42.

As noted above, the inventive light emitting apparatus includes a primary light source comprising a GaN semiconductor light-emitting device that emits a first light of a wavelength of 380 nm to 500 nm, the GaN semiconductor light-emitting device including a single

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reflective layer, and a transparent electrode disposed above the single reflective layer (e.g., see Application at page 22, line 25 through page 23, line 6), thereby enhancing the efficiency of light extracted from the GaN semiconductor light emitting device.

The novel combination of features of the claimed invention is not taught or suggested by Soules. Indeed, the Examiner does not even allege that Soules teaches or suggests a transparent electrode disposed above the single reflective layer.

As stated by the Examiner in the Office Action, Soules merely discloses LEDs or laser diodes that emit primary, blue light in the range of 420-470nm. The LED is covered with a phosphor-containing polymer layer (15) and clear polymer lens (16), and both of these materials may be composed of the same material, such as silicone.

B. The Butterworth Reference

Applicants submit that there are elements of the claimed invention that are not taught or suggested by Butterworth.

That is, Butterworth does not teach or suggest "*a transparent electrode disposed above said single reflective layer*" as recited in independent claim 1, and similarly recited in independent claims 11, 21, and 42.

The novel combination of features of the claimed invention is not taught or suggested by Butterworth. Indeed, the Examiner does not even allege that Butterworth teaches or suggests a transparent electrode disposed above the single reflective layer. The Examiner merely relies upon Butterworth as teaching that a fluorescent-material-containing resin may be contained in the cup portion of a cup-shaped lead frame with a transparent resin sealing member formed thereabove.

Butterworth merely discloses a white LED 100 that includes a blue emitting gallium nitride (GaN) die 110 mounted on a reflector cup lead frame 120 (col. 1, lines 31-35). A blob of cerium (Ce) activated yttrium aluminum garnet (YAG) phosphor 130 is placed on top of the LED die 110 (col. 1, lines 36-38).

C. The Tsutsui Reference

Applicants submit that there are elements of the claimed invention that are not taught

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or suggested by Tsutsui.

That is, Tsutsui does not teach or suggest "*a transparent electrode disposed above said single reflective layer*" as recited in independent claim 1, and similarly recited in independent claims 11, 21, and 42.

The novel combination of features of the claimed invention is not taught or suggested by Tsutsui. Indeed, the Examiner does not even allege that Tsutsui teaches or suggests a transparent electrode disposed above the single reflective layer. The Examiner merely relies upon Tsutsui as teaching a GaN emitter formed on a sapphire substrate and for teaching that the GaN chip may further possess a light reflection film 11 on the rear side of the sapphire substrate for reflecting light that is directed toward the substrate and back toward the front, upper light emission surface.

D. The Nakamura Reference

The Examiner alleges that Nakamura would have been combined with Soules, Butterworth and Tsutsui to teach the claimed invention of claims 1-3, 6-10, 21, 22, 26-28, 30-34, 38, 40-42, 59, 61 and 62. Applicants submit, however, that even if these references were combined, the combination would not teach or suggest each and every element of the claimed invention.

That is, neither Soules, Butterworth, Tsutsui nor Nakamura, nor any combination thereof teaches or suggests "*a transparent electrode disposed above said single reflective layer*" as recited in independent claim 1, and similarly recited in independent claims 11, 21, and 42.

As noted above, the inventive light emitting apparatus includes a primary light source comprising a GaN semiconductor light-emitting device that emits a first light of a wavelength of 380 nm to 500 nm, the GaN semiconductor light-emitting device including a single reflective layer, and a transparent electrode disposed above the single reflective layer (e.g., see Application at page 22, line 25 through page 23, line 6), thereby enhancing the efficiency of light extracted from the GaN semiconductor light emitting device.

The novel combination of features of the claimed invention is not taught or suggested by Nakamura. Indeed, the Examiner attempts to rely on the light transmitting electrode (15)

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of Nakamura to support his allegations as teaching the inventive transparent electrode of the claimed invention. The Examiner, however, is clearly incorrect.

Nakamura merely discloses a GaN-based LED formed on various substrates such as sapphire, wherein a light transmitting electrode (15) is formed above the p-side semiconductor layer. Nakamura states that "light-transmitting" means that the electrode transmits at least 1% of the light emitted from the gallium nitride-based III-V Group compound semiconductor light-emitting device therethrough, and does not necessarily mean colorless or transparent. Nakamura further states that a light-transmitting electrode usually transmits 20%-40% of the light emitted from the device therethrough (Nakamura at column 4, lines 55-64).

Nowhere, however, in this passage (nor anywhere else for that matter) does Nakamura teach or suggest a transparent electrode disposed above the single reflective layer. The Examiner states that the present claims do not set forth any objective values for what percentage of light transmission constitutes "transparent".

However, Applicants rely on the plain meaning of the word "transparent". A transparent material has the property of transmitting light with little absorption, reflection and scattering. Applicants respectfully assert that transmitting only "at least 1% - but usually 20 to 40%" would not be considered as transmitting light with little absorption, reflection and scattering. Nakamura teaches a light transmitting electrode that allows usually 60% to 80%, and up to 99%, of light to be absorbed, reflected or scattered. Applicants respectfully submit that a substance such as that in Nakamura, which transmits only "at least 1% - but usually 20 to 40%" would not be construed by one of ordinary skill in the art as "transparent."

Furthermore, independent claim 1 (and similarly independent claims 21 and 42) recites at least the features of a transparent electrode disposed above the single reflective layer. Nowhere does Nakamura even mention, let alone teach or suggest, a transparent electrode disposed above the single reflective layer.

Therefore, Applicants submit that these references, even if combined, would not teach or suggest each and every element of the claimed invention. Therefore the Examiner is respectfully requested to withdraw this rejection.

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E. The Hampden-Smith Reference

The Examiner alleges that Hampden-Smith would have been combined with Soules, Butterworth, Tsutsui and Nakamura to teach the claimed invention of claims 11-13, 16-20, 39 and 60. Applicants submit, however, that even if these references were combined, the combination would not teach or suggest each and every element of the claimed invention.

That is, neither Soules, Butterworth, Tsutsui, Nakamura nor Hampden-Smith, nor any combination thereof teaches or suggests "*a transparent electrode disposed above said single reflective layer*" as recited in independent claim 1, and similarly recited in independent claims 11, 21, and 42.

The novel combination of features of the claimed invention is not taught or suggested by Hampden-Smith. Indeed, the Examiner merely attempts to rely on Hampden-Smith as allegedly teaching various sulfur-containing phosphors that can be used in an array of applications including photoluminescence. The Examiner relies on columns 35-37 of Hampden-Smith to support his allegations.

Nowhere, however, in this passage (nor anywhere else for that matter) does Hampden-Smith teach or suggest a transparent electrode disposed above the single reflective layer. Indeed, Hampden-Smith merely teaches using ZnS:Eu, Cu, Au, and Al phosphors for various hues of blue/green light and CaS:Eu for read light (see Hampden-Smith at column 36, lines 8-19). The Examiner does not even allege that Hampden-Smith teaches a transparent electrode disposed above the single reflective layer. Thus, Hampden-Smith fails to provide the deficiencies of Soules, Butterworth, Tsutsui and Nakamura.

Therefore, Applicants submit that these references, even if combined, would not teach or suggest each and every element of the claimed invention. Therefore the Examiner is respectfully requested to withdraw these rejections.

F. The Thompson Reference

The Examiner alleges that Thompson would have been combined with Soules, Butterworth, Tsutsui and Nakamura to teach the claimed invention of claim 25. Applicants submit, however, that even if these references were combined, the combination would not

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teach or suggest each and every element of the claimed invention.

That is, neither Soules, Butterworth, Tsutsui, Nakamura nor Thompson, nor any combination thereof teaches or suggests “*a transparent electrode disposed above said single reflective layer*” as recited in independent claim 1, and similarly recited in independent claims 11, 21, and 42.

The novel combination of features of the claimed invention is not taught or suggested by Thompson. Indeed, the Examiner merely attempts to rely on Thompson as allegedly teaching a full-color LED assembly comprising two LEDs and a photoluminescent downconverter phosphor disposed for re-emission of longer wavelength light in response to light that is emitted from only one of the two LEDs. The Examiner relies on the disclosure of Thompson to support his allegations.

Nowhere, however, in this passage (nor anywhere else for that matter) does Thompson teach or suggest a transparent electrode disposed above the single reflective layer. Indeed, the Examiner does not even allege that Thompson teaches a transparent electrode disposed above the single reflective layer. Thus, Thompson fails to provide the deficiencies of Soules, Butterworth, Tsutsui and Nakamura.

Therefore, Applicants submit that these references, even if combined, would not teach or suggest each and every element of the claimed invention. Therefore the Examiner is respectfully requested to withdraw these rejections.

G. The Komoto Reference

The Examiner alleges that Komoto would have been combined with Soules, Butterworth, Tsutsui and Nakamura to teach the claimed invention of claims 46, 49 and 50. Applicants submit, however, that even if these references were combined, the combination would not teach or suggest each and every element of the claimed invention.

That is, neither Soules, Butterworth, Tsutsui, Nakamura nor Komoto, nor any combination thereof teaches or suggests “*a transparent electrode disposed above said single reflective layer*” as recited in independent claim 1, and similarly recited in independent claims 11, 21, and 42.

The novel combination of features of the claimed invention is not taught or suggested

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by Komoto. Indeed, the Examiner merely attempts to rely on Komoto as allegedly teaching a plurality of light emitting devices arranged in a matrix for various types of displays, that the fluorescent material may be dispersed in a layer that is formed on top of a subjacent light transmittable layer that focuses the light, and that the device may include two light transmission layers respectively including first and second materials. The Examiner relies on column 2, lines 25 et. seq. and Figures 30C and 41-46 of Komoto to support his allegations.

Nowhere, however, in this passage or these figures (nor anywhere else for that matter) does Komoto teach or suggest a transparent electrode disposed above the single reflective layer. Indeed, the Examiner does not even allege that Komoto teaches a transparent electrode disposed above the single reflective layer. Thus, Komoto fails to provide the deficiencies of Soules, Butterworth, Tsutsui and Nakamura.

Furthermore, Komoto does not teach "a first fluorescent material resin and a second fluorescent material resin, said first fluorescent material is dispersed in said first fluorescent material resin,...and said second fluorescent material is dispersed in said second fluorescent material resin, which is disposed on said first fluorescent material resin" as recited in claim 50.

The Examiner alleges that Komoto teaches providing two light transmission layers respectively including first and second materials. In fact, Komoto teaches a dipping resin (142E) formed inside of a molded resin (140E) and that the dipping resin (142E) contains the fluorescent material (see Komoto at column 28, lines 50-57; and Figure 41). Komoto teaches two resin layers and that each resin layer may contain the fluorescent material.

Komoto, however, does not teach that each of the resin layers includes a different fluorescent material. In fact, nowhere does Komoto even mention a first fluorescent material and a second fluorescent material, let alone teach or suggest a first fluorescent material resin and a second fluorescent material resin, the first fluorescent material is dispersed in the first fluorescent material resin, and the second fluorescent material is dispersed in the second fluorescent material resin, which is disposed on the first fluorescent material resin.

Therefore, Applicants submit that these references, even if combined, would not teach or suggest each and every element of the claimed invention. Therefore the Examiner is respectfully requested to withdraw these rejections.

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H. The Shimizu Reference

The Examiner alleges that Shimizu would have been combined with Soules, Butterworth, Tsutsui and Nakamura to teach the claimed invention of claims 43-45. Applicants submit, however, that even if these references were combined, the combination would not teach or suggest each and every element of the claimed invention.

That is, neither Soules, Butterworth, Tsutsui, Nakamura nor Shimizu, nor any combination thereof teaches or suggests "*a transparent electrode disposed above said single reflective layer*" as recited in independent claim 1, and similarly recited in independent claims 11, 21, and 42.

The novel combination of features of the claimed invention is not taught or suggested by Shimizu. Indeed, the Examiner merely attempts to rely on Shimizu as allegedly teaching that it was conventionally known to provide LED groups comprising R,G,B and W LEDs for various conventional light purposes. The Examiner relies on Figure 12 of Shimizu to support his allegations.

Nowhere, however, in this figure (nor anywhere else for that matter) does Shimizu teach or suggest a transparent electrode disposed above the single reflective layer. Indeed, the Examiner does not even allege that Shimizu teaches a transparent electrode disposed above the single reflective layer. Thus, Shimizu fails to provide the deficiencies of Soules, Butterworth, Tsutsui and Nakamura.

Therefore, Applicants submit that these references, even if combined, would not teach or suggest each and every element of the claimed invention. Therefore the Examiner is respectfully requested to withdraw these rejections.

I. The Chiyo Reference

The Examiner alleges that Chiyo would have been combined with Soules, Butterworth, Tsutsui and Nakamura to teach the claimed invention of claims 51-58. Applicants submit, however, that even if these references were combined, the combination would not teach or suggest each and every element of the claimed invention.

That is, neither Soules, Butterworth, Tsutsui, Nakamura nor Chiyo, nor any

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combination thereof teaches or suggests "*a transparent electrode disposed above said single reflective layer*" as recited in independent claim 1, and similarly recited in independent claims 11, 21, and 42.

The novel combination of features of the claimed invention is not taught or suggested by Chiyo. Indeed, the Examiner merely attempts to rely on Chiyo as allegedly teaching that the blue-emitting LED active region may be composed of InGaN MQWs. The Examiner relies on column, lines 57-65 of Chiyo to support his allegations.

Nowhere, however, in this passage (nor anywhere else for that matter) does Chiyo teach or suggest a transparent electrode disposed above the single reflective layer. Indeed, the Examiner does not even allege that Chiyo teaches a transparent electrode disposed above the single reflective layer. Thus, Chiyo fails to provide the deficiencies of Soules, Butterworth, Tsutsui and Nakamura.

Therefore, Applicants submit that these references, even if combined, would not teach or suggest each and every element of the claimed invention. Therefore the Examiner is respectfully requested to withdraw these rejections.

IV. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicants submit that claims 1-3, 6-13, 16-22, 25-28, 30-34, 38-46, and 50-62, all of the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

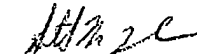
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The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

Date: August 25, 2004



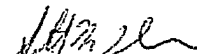
Scott M. Tulino, Esq.
Reg. No. 48,317

Sean M. McGinn, Esq.
Reg. No. 34,386

McGinn & Gibb, PLLC
8321 Old Courthouse Road, Suite 200
Vienna, VA 22182-3817
(703) 761-4100
Customer No. 21254

CERTIFICATION OF FACSIMILE TRANSMISSION

I hereby certify that I am filing this Amendment by facsimile with the United States Patent and Trademark Office to Examiner Bradley W. Baumeister, Group Art Unit 2815 at fax number (703) 872-9306 this 25th day of August, 2004.



Scott M. Tulino, Esq.
Reg. No. 48,317

Sean M. McGinn, Esq.
Reg. No. 34,386